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TRANSFERRING AND FIXING SYSTEM AND METHOD USING A GUIDED CONVEYOR SECTION AND A FREE CONVEYOR SECTION

The invention concerns a device and a method for transfer printing of an electrostatically charged toner image from an intermediate carrier of an electrographic printer or copier onto a recording medium and fixing of the transfer-printed toner image onto the recording medium.

In electrographic printers or copiers, the transfer of a toner image from an intermediate carrier (for example a photoconductor drum or a photoconductor ribbon) onto a recording medium is designated as transfer printing. The section of the printing or copying device at which the intermediate carrier and the recording medium are brought into contact with one another is designated as a transfer printing region. In the transfer printing region, the intermediate carrier (meaning, for example, the generated surface of a photoconductor drum) and the recording medium move in the same direction with the same speed while the toner is transferred from the intermediate carrier onto the recording medium. A print image of high quality can only be achieved on the recording medium when a uniform contact between recording medium and intermediate carrier is produced in the transfer printing region and when the recording medium and the intermediate carrier actually move with exactly the same speed in the transfer printing region.

In known printing or copying devices, the recording media are transported with transport rollers in the transfer printing region and sprayed on the side facing away from the intermediate carrier with a charge whose polarity sign is opposite to the charge of the toner image and of the intermediate carrier. The recording medium is thereby attracted by the intermediate carrier and transported through the transfer printing region adhering to this; at the same time the charge of the recording medium effects the transfer of the charged toner particles from the intermediate carrier onto the recording medium. Upon leaving the transfer printing region, the

recording medium is then discharged with the aid of a discharge device with which it is loosened from the intermediate carrier and transported to a fixing device.

A transfer printing device of this type is known from WO 98/58297 A1. This transfer printing device has a contact element to press the recording medium onto the intermediate carrier. From WO 98/18052, a printer is known which two similar printing groups to which recording media are supplied via an input section. The printed recording medium are output via a common output section. An outlet channel is associated with the one printing group, via which outlet channel the recording medium that have been printed on one side by this printing group can be re-supplied to this printing group for printing of the back side. A recording medium printed by the other printing group can be removed via the outlet channel to the output section by bypassing the transfer printing transport path of the first-cited printing group.

Further prior art is to be learned from the documents DE 199 56 505 A1, DE 43 24 148 C2, US 5 666 622 A, US 2002/057933 A1, DE 40 39 158 A1, JP 2002-268 301 A, DE 77 36 767 U1 and DE 34 06 290 C2.

During the transport of an recording medium from the transfer printing region to the fixing device, its printed side may not be contacted because the not-yet-fixed toner image would otherwise be smeared. In conventional devices for transport of the printed recording medium, a vacuum table is therefore typically used in which the recording medium is held on a transport ribbon via suction pressure. In the fixing device, the recording medium is guided between two rollers whose generated surfaces abut closely to one another along a surface line and form a roller contact region or transport gap. The roller contact region or, respectively, transport gap is also often designated in the German literature with the English term “nip”. Of the two rollers at least one is heated, and the toner image is affixed on the recording medium via pressure and heat.

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Upon entrance of the recording medium into the roller contact region, the fixing rollers perform an additional milling task, whereby the recording medium is temporarily braked (this experiences a sudden jarring) that is in the direction opposite the transport direction. The distance between fixing rollers and transfer printing region is often less than the length of the longest recording medium to be printed in compactly designed printers or copying devices and in particular in devices with two printing groups. By the "length" of the recording medium, what is always meant in the following is the dimension of the recording medium in the transport direction, thus the length of the edges of the recording medium that are arranged parallel to the transport path. Given a rectangular recording medium, these do not necessary have to be the "lengthwise edges", but rather can also be its transverse edges, namely when it is printed in the landscape format.

When the distance between the transfer printing region and the fixing rollers is shorter than the length of the recording medium, it can occur that the leading edge of the recording medium experiences a jarring in the roller contact region while the recording medium is still being printed at a rear section. In the event that this jarring transfers to the rear section, this leads to a smearing of the print image which is unacceptable.

The invention is based on the object to specify a device and a method of the previously cited type with which a print image of high quality can be generated given a compact design.

This object is inventively achieved via the features of the claims 1 and 19. Advantageous developments of the invention are specified in the further claims.

A compact design of the device inevitably leads to a small distance between transport ribbon and the fixing device. Due to the spatial proximity, the transport ribbon is likewise heated by the heat necessary for fixing, whereby it can deform and thereby be impaired with regard to its function. Moreover, given heating of

the transport ribbon the danger exists that toner located on it begins to melt and adheres on the transport ribbon.

The guided transport section is inventively arranged in a transport unit and the fixing device is inventively arranged in a fixing unit that are used independently of one another in the printer or copier and can be removed from these. Via the structural separation of the two units, no heat can be transferred over common components, for example circuit boards.

The fixing unit thereby has a wall designed as a hollow chamber profile that offers a good heat insulation. In a particularly advantageous development, the hollow chamber profile has openings through which air can be drawn for cooling of the transport unit.

In the device and a method according to an advantageous development of the invention, the recording medium lying on an electrostatically chargeable transport ribbon and adhered to this via electrostatic forces is transported along a subsequent guided transport section and conveyed, via a free transport section (subsequent to the guided transport section) in which the recording medium can freely arch, to a fixing device in which the recording medium is again guided in a fixed manner.

A "free transport section" designates in this document a transport section on which the recording medium freely arch, thus can form a wave or a buckle, whereby the distance between its front and rear edge is shortened. By forming an arch or wave, the shock that is exerted on its front edge upon entry of the recording medium into the roller contact region of the fixing roller can be absorbed.

The developed device or, respectively, method thus effectively prevents a smearing of the print image. On the one hand, a stronger adhesion can be achieved with the aid of an electrostatically-chargeable transport ribbon than with a vacuum table, such that the section of the recording medium located in the guided transport

section can be not-so-lightly braked by the shock. On the other hand, the shock can be absorbed by the possibility for wave formation in the free transport section.

A secure guidance of the recording medium in the guided transport section assumes a sufficient electrostatic charge of the transport ribbon that is maintained over the entire length of the guided transport section. The transport band therefore preferably has a specific volume resistance of between 10^{11} and 10^{15} Ωcm. In a particularly advantageous embodiment, the transport ribbon is significantly comprised of polyvinylidenfluoride (PVDF).

In spite of compact design, the guided transport section must be long enough to ensure a sufficiently safe guidance that precludes a smearing of the print image in the transfer printing region. The length L_1 of the guided transport section is preferably between 100 and 210 mm.

The length L_2 of the free transport section must be large enough that a wave with not-too-slight curvature can form to absorb the shock. L_2 is preferably 1/3 of the length of the shortest recording medium to be printed. A good wave formation results given a length of L_2 between 80 and 130 mm.

For better understanding of the present invention, in the following reference is made to the preferred exemplary embodiment shown in the drawings which is described using specific terminology. However, it is noted that the protective scope of the invention should not thereby be limited, since such variations and further modifications to the shown device and the method as well as to such further applications of the invention as they are shown therein are viewed as typical present or future expertise of a competent average man skilled in the art.

In addition to representations of the prior art, Figures show an exemplary embodiment of the invention, namely

Fig. 1 a schematic representation of the components of an electrographic printing or copying device participating in the image generation, with a conventional device for transfer printing of a toner image from an intermediate carrier onto a recording medium and fixing of the transfer-printed toner image onto the recording medium,

Fig. 2 a schematic representation of a recording medium given entrance into the roller contact region of two fixing rollers,

Fig. 3 the device for transfer printing and fixing from Fig. 1 with a recording medium with low rigidity,

Fig. 4. the device for transfer printing and fixing from Fig. 1 with a recording medium with high rigidity,

Fig. 5 a schematic representation of the components of an electrographic printing or copying device participating in the image generation, with a device for transfer printing of a toner image from an intermediate carrier onto a recording medium and fixing of the transfer-printed toner image onto the recording medium according to a development of the invention,

Fig. 6 the device for transfer printing and fixing from Fig. 5 with a recording medium with high rigidity, and

Fig. 7 a section view of a transport unit and a fixing unit.

The components of an electrographic printer participating in the image generation are schematically shown in Fig. 1. The main features of the electrographic printing or copying are explained briefly with regard to these in the following.

A photoconductor drum 10 is shown in cross-section in Fig. 1 whose peripheral area is coated with a photosemiconductor, for example arsentriselenide (As_2Se_3). Such a photosemiconductor has a high dark resistance that, however, decreases given sufficient exposure. The photoconductor drum 10 rotates in the direction indicated with the arrow 12. Its photoconductor layer is thereby initially electrostatically charged with the aid of what is known as a charge corotron 14. Via rotation of the photoconductor drum 10, the charged section arrives at a character generator 16 with a light source 18 (an LED comb in Fig. 1) with which the photoconductor drum 10 is exposed. The electrical resistance of the photoconductor drum layer drops at the exposed locations and the charge discharges. Image points of a latent charge image are thus generated on the photoconductor drum.

Given a further rotation of the photoconductor drum 10, the latent charge image arrives at a developer station 20 from which triboelectrically-charged toner is transferred (with the aid of a suitable electrical field) from a developer roller 22 onto the exposed locations (what is known as "dark writing") or unexposed locations (what is known as "light writing") of the photosemiconductor. The charge image located on the photoconductor drum 10 is thus inked with toner, i.e. developed. The toner image is subsequently transferred onto a recording medium, for example a sheet of paper 24. The photoconductor drum 10 is therefore generally designated as an intermediate carrier.

The sheet 24 is transported into the transfer printing region 28 with the aid of transport rollers 26. The section at which the photoconductor drum 10 and the sheet 24 come in contact with one another and the toner image is transferred onto the sheet 24 is designated with "transfer printing region". In the conventional device shown in Fig. 1 for transfer of the toner image from the photoconductor drum 10 onto the sheet 24, the latter is sprayed (with the help of what is known as a transfer corotron 30) on its underside with charge that is opposite to the charge of

the toner. The sheet 24 thereby adheres to the photoconductor drum 10 and the toner is transferred onto the sheet 24 via the electrostatic adhesion.

To separate the sheet 24 from the photoconductor drum 10, it is subsequently discharged again with the aid of an alternating current corotron 32, such that the electrostatic adhesion forces disappear and the sheet 24 shears from the photoconductor drum 10 due to its rigidity. The printed sheet 24 is then transported into a fixing device 3 via a vacuum table 34. Toner remaining on the photoconductor drum 10 after the transfer printing is removed by a cleaning unit 50.

The fixing device 36 has two rollers, a heated fixing roller 38 and a pressure roller 40 that presses against the fixing roller 38 and, with this, forms a roller contact region 44. The rollers 38 and 40 rotate in a direction (characterized with arrows 42) with a circumferential velocity v_f.
[sic] For fixing, the sheet is guided along the transport path 46 through the roller contact region 44. All components participating in transfer printing and fixing are situated in a common structural unit 48.

The device from Fig. 1 is kept so compact that the distance between transfer printing region 28 and fixing device 36 is smaller than the length of the longest recording medium to be printed. This means that the leading edge of such a recording medium already enters into the roller contact region 44 while a rear section of the same is still being printed in the transfer printing region 48.

In Fig. 2, the fixing device 36 is shown in which the leading edge of the recording medium 24 enters into the roller contact region 44 formed by the fixing roller 38 and the pressure roller 40. As is to be seen in Fig. 2, the rollers 38 and 40 are thereby deformed. Upon entering into the roller contact region 44, the leading edge of the sheet is temporarily braked and experiences a shock with an impact

force F_s. The impact force F_s is opposite to the movement direction of the sheet 24 and is represented in Fig. 2 by a force arrow.

In Fig. 3, for reasons of clarity only those components of the conventional arrangement of Fig. 1 are shown that are participating in the transfer printing and the fixing. Furthermore, a sheet 24' is shown in Fig. 3 whose leading edge directly enters into the roller contact region 44 of the rollers 38 and 40 and thus experiences the impact force F_s just described while a rear section of the sheet 24' is still located in the transfer printing region 28.

In the snapshot shown in Fig. 3, the impact force F_s leads to formation of a wave 52 in the sheet 24'. In this context, what is meant with "wave" is a curved section of the sheet 24' that deviates from the actual provided transport path. The sheet 24' of Fig. 3 has lower rigidity, such that only a slight force is required in order to curve the sheet into a wave 52. Moreover, the tendency of the sheet 24' to shear away from the vacuum table 34 upon formation of the wave 34 is low due to the low rigidity of the sheet 24'. The suction force of the vacuum table 34, which is shown in Fig. 3 by the arrow pointing perpendicularly downwards, is sufficient to prevent a shearing of the sheet 24' from the vacuum table 34. The rear section of the sheet 24' is thus guided on the vacuum table and the impact force F_s is not transferred until the transfer printing region.

The same components are shown in Fig. 4 as in Fig. 3, only in Fig. 4 a sheet 24' with a higher rigidity is transported. Due to the higher rigidity of the sheet 24'', in the representation of Fig. 4 no wave is formed; instead of this the sheet 24'' shears from the vacuum table 34. The sheet 24'' is nearly stretched, such that the impact force F_s is transferred up to the transfer printing region 28, whereby the print image is smeared.

The specified problem of the print image smearing can only be avoided with great additional effort in the conventional device of Fig. 1, 3 and 4. For example, the

shock can be largely attenuated via a suitable speed control of the fixing rollers 38 and 40 that is triggered by the infeed of the leading sheet edge into the roller arrangement. However, the control must account for the thickness of the paper on which the impact force F_s is dependent. This requires an elaborate sensor technology with a corresponding regulation device. Given sheets with high inherent rigidity and large thickness, a print image smearing cannot be completely prevented even with such a controller. In this case, the pressure force of the rollers upon entrance of the leading sheet edge into the roller contact region 44 must be temporarily reduced, which in turn requires a high mechanical effort and additionally impairs the fixing quality in the region of the leading edge.

An arrangement of components participating in the image generation that is identical in significant parts is schematically shown in Fig. 5 as in Fig. 1, in which is shown, however, a device for transfer printing and fixing according to a development of the invention. The device has a transport ribbon 54 that is guided around a first roller 56, a second roller 58, a third roller 60 and a positioning roller 62. In the representation of Fig. 5, the transport ribbon 54 is driven counterclockwise by the first roller 56 with a circumferential speed v_0 that coincides with the tangential speed of the generated surface of the photoconductor drum 10. The third roller 60 is pre-stressed with a spring 64, such that it exerts a tensile stress on the transport ribbon 54. The positioning roller 62 is arranged between the first roller 56 and the transfer printing region 28 and positions the transport ribbon 54 outwards relative to an alignment 66 of the first and second roller 56, 58. The positioning roller 62 provides for a narrow arrangement of the transport ribbon 54 on the photoconductor drum 10, in that the transport ribbon loops around the photoconductor drum in the transfer printing region, i.e. contacts the generated surface of the photoconductor drum over a certain angle range.

A cleaning device 68 is arranged below the transport ribbon 54. The cleaning device 68 has a blade 70 that is arranged transverse to the running direction of the

transport ribbon 54 and is arranged abutting this and a toner capture reservoir 72 into which toner abraded from the transport ribbon 54 by the blade 70 falls.

A blade-like element 74 that is connected with a voltage source 76 (schematically shown) and serves to charge the transport ribbon 54 abuts on the side of the transport ribbon 54 facing away from the photoconductor drum 10. The transport ribbon 54 with the associated rollers 56, 58, 60 and 62, the cleaning device 68 and the contact blade 74 are structurally integrated into a transport unit 78 that is represented by a framework shown dashed in the schematic representation of Fig. 5.

In Fig. 5, a fixing device 36 is shown that does not significantly differ from those of Fig. 1, 3 and 4, however is integrated into a structurally independent fixing unit 80 that is likewise schematically shown by a framework shown dashed. A guide plate 82 also belongs to the fixing unit 80. A discharge device 84 is arranged above the first roller 56.

The function of the device is explained in detail in the following with reference to Fig. 5. The transport ribbon 54 is charged via the contact blade 74 to an electrostatic potential of some kilovolts relative to a ground potential, whereby the polarity sign of the charge of the transport ribbon 54 is different from the polarity sign of the charge of the toner image on the photoconductor drum 10. A recording medium 24 is conveyed onto the transport ribbon 54 with the aid of transport rollers 26 in the region of the second roller 58 and electrostatically adheres to this transport band 54. In the transfer printing region, the transport ribbon 54 loops around the photoconductor drum 10 at a certain angle range and thereby produces a uniform contact between the sheet 24 lying on the transport ribbon 54 (and adhering thereto) and the photoconductor drum 10.

The transport ribbon 54 has a specific volume resistance between 10^{11} and 10^{15} Ωcm, such that the it [sic] on the section between the first roller 56 and the transfer

printing region 28 retains a sufficient electrostatic charge in order to hold the sheet 24 on it via electrostatic forces. The transport path between the transfer printing region 28 and the first roller 56 is therefore called a "guided transport section" in the following. A particularly good guidance results given a transport ribbon that is significantly comprised of polyvinylidenfluoride (PVDF), has a specific volume resistance of 8×10^{12} Ωcm and a thickness of 150 µm.

The first roller 56 is an antistatic roller made from silicon with a specific volume resistance of 10^8 Ωcm and is therefore suited to dissipate a larger part of the charge of the transport ribbon 54 away from this at the end of the guided transport section. The first roller 56 has a diameter of less than 28 mm, such that the transport ribbon 54 is relatively significantly curved on said roller 56 and the sheet 24 easily shears from the transport ribbon 54 guided around the first roller 56.

Depending on the charge strength and composition of the transport ribbon 54, it can be advantageous to already have dissipated a certain charge quantity from the transport ribbon 54 at the positioning roller 62. The quantity of the charge dissipated at the drawing roller can be influenced by its material, for example the choice between metal and plastic.

During the guided transport section, the transfer-printed but not-yet-fixed toner is held on the sheet 24 by the electrostatic attraction of the transport ribbon 54. After the shearing of the sheet 24 from the transport roller 54 in the region of the first roller 56, this attraction is lacking and the similarly-charged toner particles tend to repel one another and accumulate in conductive parts located in the surroundings and contaminate these. In order to prevent this, upon shearing of the sheet 24 from the transport ribbon 54, the toner located on the sheet 24 is discharged with the aid of the discharge device 84.

The sheet sheared from the transport ribbon 24 is guided over the guide plate 82 into the fixing unit 80 and there is fixed. Outside of gravity, no forces affect the

sheet 24 between the first roller 56 and the roller contact region 44. This section is therefore called a free transport section in the following. In the free transport section, the sheet 24 has the possibility to form a wave, thus to absorb the described impact force F_s.

Fig. 6 is a snapshot in which the leading edge of a sheet 24'' enters in the roller contact region 44 while a rear section of the sheet 24'' is still being printed in the transfer printing region 28. Although the sheet 24'' is the same sheet as in Fig. 4, here the shock is not transferred into the transfer printing region 28; rather, the sheet 24'' remains adhered to the transport ribbon 54 in the guided transport section while a wave forms in the free transport section.

Two reasons can be cited for the better behavior in the device of Fig. 6 relative to the device of Fig. 4. On the one hand, with the transport ribbon 54 presented here a clearly higher adhesion force of the sheet 24'' to the transport ribbon 54 can be achieved than with a vacuum table. The adhesion forces between the sheet 24'' and the transport ribbon 54 are represented in Fig. 6 by the vertical force arrows pointing downwards. The adhesion force in the direction of the first roller 56 does in fact decrease with the charge density in the transport ribbon 54, but even in the proximity of the first roller 56 it is large enough in order to prevent a shearing of the sheet 24''. Even if the wave should project somewhat into the guided transport section, the safe guidance in the transfer printing region is not impaired since, first, the impact force abates with the propagation of the wave and, second, the adhesion force of the sheet 24'' to the transport ribbon 54 increases in the direction of the transfer printing region 28.

On the other hand, the free transport section in which the wave can form is clearly larger than the free section in the device of Fig. 3 and 4, such that a flatter wave can form that has a lesser tendency to shear from the transport ribbon 54 than a more significantly curved wave.

In Fig. 6, the length of the guided transport section is designated with L_1 and the length of the free transport section is designated with L_2. Given a compact design, a certain, optimally smaller distance is aimed for between transfer printing region and fixing device, i.e. a certain value for the sum of L_1 and L_2. A larger value for L_1, i.e. a longer guided transport section, has the advantage that the total retention force that the sheet 24'' experiences is relatively large. However, a larger value for L_2 has the advantage that a flatter wave can form, such that the shear forces are less. Given a sought value for $L_1 + L_2$, an optimally ideal compromise must thus be found between L_1 and L_2.

However, by comparison with Fig. 3 and 4 it is immediately clear that as good a behavior never results with the conventional device with a likewise compact design (i.e. with an equal distance between transfer printing region 28 and fixing device 36) as with the device of Fig. 5 and 6. In the device from Fig. 3 and 4, the guided region does not already begin in the transfer printing region 28 because the sheet 24' or, respectively, 24'' must be discharged in direct connection with the transfer printing so that it loosens from the photoconductor drum 10. Since the discharge requires some time, however at the same time a high process speed is sought, the ribbon discharge region cannot be selected significantly shorter than as shown in Fig. 3 and 4. The ribbon discharge region is thus lost, both for the retention of the sheet 24' or, respectively, 24'' and for the wave formation.

A secure guidance of the sheet 24'' in the proximity of the transfer printing region 28 directly contributes to preventing a print image smearing. In the device from Fig. 5 and 6, the retention force of the sheet 24'' on the transport ribbon 54 is strongest in proximity to the transfer printing region 28, while in the device from Fig. 3 and 4 the sheet 24' or, respectively, 24'' is not guided at all in proximity to the transfer printing region 28 because it still has to be discharged.

In order to achieve a secure guidance of the sheet, the length L_1 in Fig. 6 should amount to at least 1/3 of the length of the shortest sheet to be printed. By length,

what is thereby meant is the dimension of the sheet in the transport direction, which can also by all means correspond to the shorter side given a rectangular sheet, namely when it is printed in portrait format. In the device from Fig. 5 and 6, a secure guidance has resulted without print image smearing given lengths of L_1 that are between 100 and 210 mm. The length L_2 may not be longer than the length of the shortest sheet to be printed (because otherwise this would not be guided at all in stretches) and should amount to at least 1/3 of the length of the shortest sheet to be printed so that a sufficiently flat wave can form.

An advantageous wave formation can be supported via suitable selection of the speed v_f with which the sheet 24'' is guided by rollers 38, 40 of the fixing device. v_f is preferably between 97% and 100% of the rotational speed v_0 of the transport ribbon 54.

The transport unit 78 and the fixing unit 90 are shown in a section representation in Fig. 7. The use of two separate structural units has two large advantages. The one concerns the assembly, which is clearly less elaborate with separate structural units. The transport unit 78 must be very precisely adjusted relative to the photoconductor drum 10 in order to ensure a good transfer printing, while the fixing unit 80 does not have to be installed with such precision. When the devices for transport and for fixing are combined in one common structural unit, as is the case with the structural unit 48 of Fig. 1, the entire structural unit must be installed with high precision in order to ensure a transfer printing of high quality. However, since just the fixing device contains heavy components, the entire structural unit 48 is much heavier and unwieldier than the transport unit 78 and therefore also clearly more difficult to precisely install.

The second advantage is that the heat radiated by the fixing roller 38 does not so significantly heat the transport ribbon as would be the case if the transport ribbon 54 and the fixing device 36 were arranged in a common structural unit. This is of

the highest importance since the transport ribbon 54 is deformed and loses its functionality due to too-great heating.

The fixing unit 80 has a housing 86 that retains the heat radiated by the fixing roller 38. In the side facing the transport unit 78, the housing 86 has walls 88 and 90 that are designed as hollow chamber profiles and therefore are good thermal insulators. The hollow chamber profile 88 is aerated with a fan (not shown) and has openings 92 through which air is drawn to cool the transport unit. The air current of the drawn-in air is schematically represented by an arrow 94. In addition to the cooling of the transport unit, the air intake also serves for cleaning of the transport unit of deposited toner particles.

The transport unit 78 and the fixing unit 80 can be advantageously designed as plug-in modules.

The air taken up into the hollow chamber profile is filtered with the aid of an ozone filter (not shown) before it is dissipated into the surroundings. In the shown embodiment, the fan (not shown) runs for approximately a half-hour after the deactivation of the printer.

Although preferred exemplary embodiments are shown and specified in detail in the drawings and the preceding specification, these should be viewed as purely exemplary and not as limiting the invention. It is noted in this regard that only the preferred exemplary embodiments are shown and specified, and all variations and modifications should be protected that presently or in the future lie within the scope of protection of the invention.

Reference list

10	photoconductor drum
12	rotation direction of the photoconductor drum
14	charge corotron
16	character generator
18	LED comb
20	developer station
22	developer roller
24	paper sheet
26	transport roller
28	transfer printing region
30	transfer corotron
32	alternating current corotron
34	vacuum table
36	fixing device
38	fixing roller
40	pressure roller
42	direction arrow
44	roller contact region
46	transport path
48	total structural unit
50	cleaning unit
52	wave
54	transport ribbon
56	first roller
58	second roller
60	third roller
62	positioning roller
64	spring
66	alignment of first and second roller

68	cleaning unit
70	blade
72	toner capture reservoir
74	contact blade
76	voltage source
78	transport unit
80	fixing unit
82	guide plate
84	discharge device
86	housing
88	hollow chamber profile
90	hollow chamber profile
92	opening
94	air current